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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/787,169	02/27/2004	Jun Wang	V9661.0056	4887

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EXAMINER
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RAYMOND, BRITTANY L

ART UNIT	PAPER NUMBER
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1756

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	03/23/2007	PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/787,169	<b>Applicant(s)</b> WANG ET AL.	
	<b>Examiner</b> Brittany Raymond	<b>Art Unit</b> 1756	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 2/8/2007.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-32 is/are pending in the application.
- 4a) Of the above claim(s) 16-20 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-15 and 21-32 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 27 February 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
     Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Election/Restrictions***

1. Applicant's election of Group I, claims 1-15 and 21-32, in the reply filed on 2/8/2007 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).
2. Claims 16-20 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on 2/8/2007.

### ***Claim Rejections - 35 USC § 102***

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1, 2, 21 and 22 are rejected under 35 U.S.C. 102(e) as being anticipated by Baselmans (U.S. Patent Application 2005/0136340).

Baselmans discloses a method of making a mask comprising: defining a plurality of pattern features and a plurality of assist features, each at selected locations (Paragraph 0023), as recited in claims 1 and 21 of the present invention. It is apparent from Figures 3 and 4 that the features are placed on a grid and are spaced in a certain

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way, or have particular grid pitches, and have the grid points perpendicular to one another, as recited in claims 1 and 21 of the present invention. Figures 3 and 4 also show that the assist features are introduced at locations, 151,152, etc., that do not have pattern features, as recited in claims 2 and 22 of the present invention. Baselmans also discloses that the assist features are not intended to appear in the pattern developed in the resist, but are used to improve the image (Paragraph 0019), as recited in claims 1 and 21 of the present invention. Baselmans states that a beam is projected through the mask to form a pattern on a substrate (Paragraph 0003), as recited in claims 1 and 21 of the present invention.

Baselmans teaches every limitation of claims 1, 2, 21, and 22 and thus anticipates the claims.

### ***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

6. Claims 7, 10, 13, 27, and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Baselmans (U.S. Patent Application 2005/0136340) in view of Neisser (U.S. Patent 5563012).

The teachings of Baselmans have been discussed in paragraph 4 above.

Baselmans fails to disclose that two masks can be made, each with subsets of the real and assist features, and are sequentially exposed to print features.

Neisser discloses a method for using multiple masks to image features onto a photoresist layer, comprising: forming enhanced and unenhanced feature patterns on an original mask, and then forming a plurality of overlay masks from this (Column 1, Lines 55-61), as recited in claims 7 and 27 of the present invention. Neisser also discloses that the masks are used in succession in order to form the pattern of the original mask onto the photoresist layer (Column 3, Lines 49-51), as recited in claim 13 of the present invention. The limitations of claims 10 and 28 have already been discussed by Baselmans in paragraph 4 above.

It would have been obvious to one of ordinary skill in this art, at the time of invention by applicant, to have separated the pattern into two masks, as suggested by Neisser, in the process of Baselmans because Neisser teaches that this technique enhances the masked image resolution in photoresists for fine feature lithography.

7. Claims 3-6, and 23-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Baselmans (U.S. Patent Application 2005/0136340) in view of Chen (U.S. Patent 6114071).

The teachings of Baselmans have been discussed in paragraph 4 above.

Baselmans also discloses that critical dimension is to be controlled when forming masks (Paragraph 0016), meaning that the pitch between two adjacent features cannot be less than a predetermined length, as recited in claims 6 and 26 of the present invention.

Baselmans fails to disclose that the grid has a pitch in two directions that are perpendicular to each other, that these pitches are chosen to minimize the circuit area, that these pitches are smaller than the minimum pitch of single exposure lithography, and that the distance between two adjacent real features is no less than the minimum pitch of single exposure lithography.

Chen discloses a method for producing fine features on a mask, which teaches that the term pitch is used for the distance between any two adjacent features (Column 2, Lines 1-2), as recited in claims 3 and 23 of the present invention. It would have been obvious to have a pitch in two directions since a grid is being used to create the mask. Chen also discloses that critical dimension and pitch are trying to be controlled so that features can be densely packed (Column 5, Lines 2-4), which means the circuit area is to be minimized, as recited in claims 4 and 24 of the present invention. Chen states that scattering bars, or assist bars, can modify features so that they behave as if they were more dense (Column 2, Lines 18-21). If the assist features are placed between two real features then this would lower the pitch below the minimum pitch requirement, as recited in claims 5 and 25 of the present invention.

It would have been obvious to one of ordinary skill in this art, at the time of invention by applicant, to have modified the mask of Baselmans in the ways suggested

by Chen because Chen teaches that these steps must be taken in order to reduce critical dimension and be able to illuminate a clear pattern onto a substrate.

8. Claims 8, 9, 11, 12, 14, 15, and 29-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Baselmans (U.S. Patent Application 2005/0136340) and Neisser (U.S. Patent 5563012) as applied to claims 1, 2, 7, 10, 13, 21, 22, 27, and 28 above, and further in view of Chen (U.S. Patent 6114071).

The teachings of Baselmans and Neisser have been discussed in paragraphs 4 and 6 above.

Baselmans and Neisser fail to disclose that the grid has a pitch in two directions that are perpendicular to each other, that these pitches are chosen to minimize the circuit area, that these pitches are smaller than the minimum pitch of single exposure lithography, and that the distance between two adjacent real features is no less than the minimum pitch of single exposure lithography. Baselmans and Neisser also fail to disclose how to calculate the diagonal distance between two adjacent features.

The teachings of Chen have been discussed in paragraph 7 above, which teach all of the limitations of claims 8, 9, 11, 12, 14, and 29-32. Although the equation of claim 15 of the present invention was not described by Chen, it is inherent because it is known by one of ordinary skill in this art that the Pythagorean Theorem is used when determining the diagonal distance between two adjacent points that are perpendicular to one another.

It would have been obvious to one of ordinary skill in this art, at the time of invention by applicant, to have modified the masks of Baselmans and Neisser in the

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ways suggested by Chen because Chen teaches that these steps must be taken in order to reduce critical dimension and be able to illuminate a clear pattern onto a substrate.


### **Conclusion**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brittany Raymond whose telephone number is 571-272-6545. The examiner can normally be reached on Monday through Friday, 8:00 a.m. - 4:30 p.m. EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Huff can be reached on 571-272-1385. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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KATHLEEN DUDA  
PRIMARY EXAMINER